

September 10, 2019

Cure RTD has awarded a \$32,000 grant to Dr. Steven Gray, PhD, at University of Texas (UT) Southwestern in Dallas, Texas, USA.

Cure RTD has awarded a \$32,000 grant to Dr. Steven Gray, PhD, at University of Texas (UT) Southwestern in Texas, USA for Phase 1 of his project “Gene Replacement Therapy for Treatment of Riboflavin Transporter Deficiency.”



Dr. Steven Gray

In recent years, scientists have made important discoveries to unlock the enormous potential of gene therapy in the treatment of disease. Replacement of the mutated gene causing RTD using gene therapy is a potential therapeutic option to not only halt RTD disease progression with a single injection, but also reverse some of the symptoms and damage that has already occurred.

In this proposal, Dr. Steven Gray and his team will begin the initial research required for the development of a gene therapy treatment for RTD. In Phase 1 of this multi-phase project, a viral vector (AAV9) will be designed to carry a healthy copy of the gene causing RTD broadly across the nervous system. Once this development is completed, Phase 2 and 3 of this project will include testing this gene viral vector in both regular mice and mice carrying RTD mutated genes to show the safety and effectiveness of the treatment. Once it is shown that the gene therapy treatment works in the mouse model of the

disease, and does not cause harm, permission will be obtained from the US Food and Drug Administration to initiate human clinical trials for individuals with RTD.

Ultimately, it will require an estimated \$3 million in research funding to bring RTD gene therapy from this current stage to achieving final approval, where it may be used to treat RTD patients. However, Cure RTD is fully committed to this partnership with Dr. Steven Gray and UT Southwestern, and plans to fund the development of this gene therapy-based treatment through all research phases until the treatment is approved.

About UT Southwestern

UT Southwestern (UTSW) is internationally recognized for its advances in biomedical research and its unmatched faculty of the nation’s top medical specialists, working together to treat complex and rare conditions of the brain. The UT Southwestern Gene Therapy Program will undoubtedly maintain this reputation as a world class leader in the development of cutting edge medical research and effective treatment outcomes.

Meet Dr. Steven Gray

Directing the scientific development of a gene therapy for RTD, Steven Gray, PhD., is considered an international expert on the development of gene therapy treatments for rare neurological diseases. Dr. Gray is currently an Associate Professor in the Department of Pediatrics at UTSW and director of the UTSW Viral Vector Facility. Dr. Gray has developed clinical trials for several other rare neurological diseases including Rett Syndrome, Giant Axonal Neuropathy, Tay-Sachs, Krabbe and Batten Disease. He has published over 50 peer-reviewed publications in top journals, including New England Journal of Medicine and Molecular Therapy, and has 3 pending patents.

What exactly is gene therapy?

In RTD and thousands of other rare diseases, a single gene mutation causes a protein to either malfunction or not be produced. This can cause death or destruction of certain cells that play key roles in vital functions. Gene therapy involves pairing up healthy copies of the malfunctioning gene with a harmless virus, referred to as a “viral vector”. Trillions of copies of the vector are made and then given to a person through a one-time injection. The healthy, normally-functioning genes are incorporated into cells, which begin to correctly produce the missing or malfunctioning protein, which in the case of RTD would be the malfunctioning riboflavin transporter protein. Researchers believe that gene therapy for RTD has the potential to not only halt disease progression, but also reverse some of the symptoms and damage that has already occurred. Gene therapy for various other diseases is currently being tested in over 600 clinical trials.

According to publications by UT Southwestern Peter O’Donnell Jr. Brain Institute, “Gene therapy has the potential to move medicine towards a model of early diagnosis and transformative treatment to avoid many incurable conditions from ever developing. Rather than managing disease, gene therapy aims to stop it permanently.”

What is the end goal of this project?

The end goal of this multi-stage project will be to provide a gene therapy treatment that replaces the mutated gene in RTD with a healthy copy of the gene. The gene replacement will be carried out using a special virus called AAV9. This virus is a safe virus that normally lives within us. The gene is “packaged” in the virus, and the virus delivers the gene to the brain and other cells.

The development of gene therapy for RTD will not only save the lives of children and adults diagnosed with RTD, but also have far-reaching effects in the medical understanding of more common neurodegenerative conditions.

Cure RTD Research Funding

This grant to Dr. Steven Gray is part of Cure RTD’s Basic Research and Drug Discovery programs that we are currently announcing for our 2019-2020 grant cycle.

Basic research is the first step in our comprehensive research model. We fund basic research to investigate the biology and cause of RTD in order to identify the most effective treatment strategies.